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ABSTRACT

This study examined the relationships among presentational stimuli (oral, visual, oral plus visual), types of content (concrete, abstract), and learner ability (high verbal, low verbal). Third grade students either heard a short story, watched pictures showing the same short story, or heard and watched a combination of the oral and picture presentations. Student recall of concrete and abstract information was measured by a constructed-response test immediately after and again two weeks after the presentations. Students learned as much or more concrete and abstract information from pictures as from oral prose, and learned the most information from the combination of oral prose with pictures. Mislearning of concrete and abstract information, such as repeating the same incorrect response on both immediate and delayed tests, was higher from the picture presentation than from the oral presentation, and lowest from the combination of oral prose with pictures. Interactions were not found among types of presentational stimuli, types of content, and levels of learner ability.
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Effects of Different Media Presentations and Messages On Children's Learning of Information

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A paper presented at the American Educational Research Association annual meeting, Los Angeles (April, 1981).

Abstract

The purpose of this study was to examine the relationships among presentational stimuli (oral, visual, oral+visual), types of content (concrete, abstract), and learner ability (high verbal, low verbal). Third grade students (N=248) either heard a short story, watched pictures showing the same short story, or heard and watched a combination of the oral and picture presentations. Student recall of concrete and abstract information was measured by a 28-item, constructed-response test immediately after and again two weeks after the presentations. Students learned as much or more concrete and abstract information from pictures as from oral prose, and learned the most information from the combination of oral prose with pictures. Mislearning of concrete and abstract information, i.e., repeating the same incorrect response on both immediate and delayed tests, was higher from the picture presentation than from the oral presentation, and lowest from the combination of oral prose with pictures. Interactions were not found among types of presentational stimuli, types of content, and levels of learner ability.

Effects of Different Media Presentations and Messages
On Children's Learning of Information

Rationale and Purpose

Considerable research has been conducted in the effectiveness of various mediated presentation formats for communicating information to learners. In attempts to identify the so-called "best medium," researchers have studied exhaustively the characteristics of different types of media and different production styles and techniques within each type of medium. Salomon and Clark (1977), however, have suggested that the emphasis in media research is shifting from the medium itself to: (a) the types of stimuli in the mediated presentation, (b) the types of learning tasks taught in the presentation, and (c) the types of learners for whom the presentation is intended. In addition, research findings have suggested that what is actually "learned" under different mediated stimuli may not be demonstrated accurately due to the type of learning assessment employed. Since learning assessment has been typically defined relative to judged accuracy of specified responses, what is actually learned (or mislearned) is often undetected. The purpose of this study was to investigate the effects of progressively mediated presentations of prose information on student learning and mislearning of concrete and abstract information.

Presentational Stimuli

Practitioners in the instructional media field stress the value of the informational load that pictures can carry in communicating content to an audience. Research findings have demonstrated the positive effects of supplementing prose with pictures

(Levin and Lesgold, 1978), but the value of the picture part of the presentation is typically confounded with the effect of the verbal presentation. The few previous studies (e.g., Rohwer and Harris, 1975; Carey and Whitaker, 1980, Note 1) that have compared verbal with pictorial presentations of the same information have reported conflicting results, with most favoring the verbal presentations. However, results in many of these studies are confounded by poor control of the quality of the materials used, making performance differences attributable to production quality rather than to the potential of a given stimulus to transmit information. Questions of relative effectiveness of different stimuli can only be studied when alternate stimuli are not "preloaded" with different amounts of criterion information.

The first objective of this study was to compare learning from oral and progressively enhanced visual presentations of the same information.

Type of Information to be Learned

The learning task in this study was recall of verbal information. Paivio (1971) theorized that the most powerful factor that determines how well information will be remembered is its location on a continuum of concreteness-abstractness: the more concrete, the more easily remembered; the more abstract, the harder to remember. Paivio and Foth (1970) further hypothesized that the concreteness-abstractness of to-be-learned information interacts with the stimulus attributes of the presentational medium. However, the nature of such interactions is still largely unknown. The second objective of this study was to investigate whether the pattern of performance across pictorial

and oral presentations is the same for concrete information as for abstract information.

Learner Variables

The ability to profit from pictorially versus verbally presented information has been demonstrated to interact with the age of learners (Christie and Schumacher, 1978; Guttman, Levin, and Pressley, 1977). Learner strategy predisposition has also been explored (Levin, Divine-Hawkins, Kerst, and Guttman, 1974). However, learner verbal ability was of primary interest in this study due to the concreteness-abstractness dimension of the learning task, and the comparison between verbal and visual stimuli. Willows (1978) found that low ability children were more picture dependent than high ability children. If this is true, then presentation formats emphasizing visual stimuli should result in findings of presentation by ability interactions. A third objective of the study was to investigate the effects of different stimuli on the learning of concrete and abstract information by high and low verbal ability students. The Total Auditory scale of the Stanford Achievement Test was used as the measure of verbal ability.

Methods of Assessing Student Learning

Test effects have been of continuous concern to educators. Rohwer and Harris (1975) reported that treatment effects were dependent not only on the type of media used, but on the means of assessing learning. Filan and Sullivan (1980, Note 2) found that students recall more information when tested in the mode (visual or verbal) in which they were instructed to recall the information. What students "learn" may often be a function of how learning is

assessed and the evaluation standards employed to judge the correctness of the responses. The final objective of this study was to investigate the relationship between types of stimuli and information, and two assessment procedures: (a) a normal, objectives-based procedure using pre-specified standards of correctness and (b) an objectives-free procedure designed to measure what was recalled without regard for standards of accuracy.

Method

Subjects

The subjects for this study were 248 third graders from the three elementary schools in a middle class school district. The population was predominately of White racial background, with a significant minority of Spanish-surname students.

Materials

Five different information presentations were developed for the study. All were adapted from the children's short story, The Wump World. The story was chosen because of its simple text and story line, and abundance of illustrations that correlated directly with the text. The five presentation conditions were: (a) ORAL, an oral presentation on audio cassette of the story, (b) PICTURE, a 35-MM slide presentation of the illustrations used in the text of the short story, (c) CLOSE-UP, the same slides used in the picture condition with added close-up shots of the criterion information found in those slides, (d) ORAL+ PICTURE, a combination of the audio tape and the picture slides, and (e) ORAL+CLOSE-UP, a combination of the audio tape and the slide set with close-ups.

The presentations all lasted the same 15 minute time period to control for time on task. The PICTURE condition contained 47 slides; the CLOSE-UP condition contained the same 47 slides plus 28 close-up shots of criterion information selected from the 47 slides. Fourteen abstract and 14 concrete nouns were chosen as criterion information. The criterion nouns were chosen according to their abstractness-concreteness ratings on norms established by Paivio, Yuille, and Madigan (1968). The norms were later validated for children by Emmerich (1979). Each presentation condition was designed to contain all of the criterion information.

Criterion Measures

One dependent measure was performance on a 28-item, cued-recall, constructed-response test. The test was given orally by means of audio cassette tape. Single-word or short-phrase responses were written on an answer sheet. Fourteen items were abstract, and 14 items were concrete. The items were matched to the 28 nouns chosen as criterion information and contained in all five presentations. This test was administered immediately after the presentations and again after a two-week delay.

A second dependent measure was derived from an analysis of the answers that students gave on their tests. The score was derived by counting the number of items for which a subject had made the same incorrect response on both the immediate and delayed tests. This score was a measure of mislearning, i.e., information that was not "correct," but was learned and remembered.

Procedures

The subjects were blocked on two levels of verbal ability

(HI or LOW) and then randomly assigned to the five presentation treatment conditions. The subjects were grouped according to treatment and the materials were group administered. Following the 15-minute presentation, subjects took a brief rest and then completed the test. The test was administered again two weeks later for a measure of delayed recall.

Design and Data Analyses

The study was a two (ability levels) by five (presentation formats) factorial design with two dependent measures (abstract recall and concrete recall). The data analyses were conducted by means of MANOVA.

Results

All effects in the study were the same for the immediate and delayed retention scores, and there were no significant differences between the immediate and delayed scores. Therefore, to simplify reporting, the mean of the immediate and delayed scores was used for the analyses in the study. The mean scores for abstract and concrete recall are summarized in Table 1.

Insert Table 1 about here

Presentational Stimuli and Types of Information

Analyses indicated a main effect for presentation for both abstract recall ($F(4,238)=20.21$, $p<.0001$) and concrete recall ($F(4,238)=23.49$, $p<.0001$). The rank order of means for both abstract and concrete recall was exactly the same: ORAL < PICTURE < CLOSE-UP < ORAL+PIC < ORAL+CLOSE. The patterns of significance for abstract and concrete recall were also the same. PICTURE and ORAL

were not significantly different, but CLOSE-UP was superior to ORAL (abstract, $p<.05$; concrete, $p<.0007$). In this study, children learned and recalled at least as much from pictures as from an oral presentation, and when attention to the criterion information was focused via close-ups, children learned more from pictures. The combination of ORAL+PIC was significantly more effective than either ORAL or PICTURE or CLOSE-UP alone (abstract, p's$<.01,.01,.05$; concrete, p's$<.01,.01,.01$).

Analysis of the results for type of content indicated that for the nouns used in this study, subjects recalled more concrete than abstract information ($F(1,238)=83.60$, $p<.0001$). However, no interaction was found between the types of stimuli and the types of content; i.e., verbal and visual presentations were equally as effective for learning abstract or concrete information.

Ability Level

Subjects of high verbal ability learned significantly more abstract and concrete information than those of low ability ($F(1,238)=49.40$, $p<.0001$); however, an interaction was not found between ability levels and types of stimuli for either abstract or concrete learning.

Mislearning

Using mislearning as the dependent variable, there was a presentation main effect for abstract learning ($F(4,238)=3.97$, $p<.004$) and concrete learning ($F(4,238)=7.75$, $p<.0001$). The mean scores for abstract and concrete mislearning are summarized in Table 2. For ease of interpretation, the visual-only conditions

Insert Table 2 about here

(PICTURE and CLOSE-UP) were combined, and the two oral+visual conditions were combined (ORAL+PIC and ORAL+CLOSE). The amount of mislearning from the ORAL presentation was less than from the visual-only presentations (abstract, $p<.01$; concrete, $p<.01$), but there was more mislearning from ORAL than from the oral+visual presentations (abstract, $p<.001$; concrete, $p<.003$).

Discussion and Conclusions

Two limitations must be kept in mind when discussing the results of this study. First, the findings are specific to the particular story, presentational materials, and criterion information used in the study. Second, the equivalence of the oral and visual forms of the story was judged only at face value. Replication of this study is needed using different content and more scientifically equated stimulus forms.

The finding that children learned as much or more from visual as from oral presentations, is generally contrary to previous research. The finding validates the use of visuals for presentation of information and provides a perspective on the relative contributions of the verbal and visual portions of combined picture-word presentations. It was no suprise that the combined oral and visual presentations were most effective, lending one more piece of evidence to the argument for providing relevant visuals in children's prose. One noteworthy point not found in previous research is that the effects of visuals were the same for abstract and concrete learning. The practical conclusion is clear, that visuals are valuable regardless of the type of information that is being taught. A final point of practical

significance is that visual close-ups seemed to help learners recall both concrete and abstract information. The explanation may be a repetition effect due to renewed learner attention caused by the slide projector changing. A more likely explanation may be that the close-ups allowed learners to isolate criterion information that they did not pick out of the full scene.

Better recall of concrete than abstract information was expected and cannot be generalized beyond this study, because no attempt was made to control for the influence of factors such as familiarity and meaningfulness.

The absence of any interaction between ability levels and presentations could be due to the careful design of the materials. Careful design could eliminate irrelevant or incongruous content that might affect low ability students more than high ability students. In view of contradictory findings from previous studies, further research would be valuable using other measures of ability.

The investigation of mislearning was exploratory in nature, and results are open to several interpretations. The low level of mislearning from the combined oral-visual presentations would be expected due to the redundancy between stimuli. An explanation of the higher mislearning for visual than for oral presentations might be that most pictures do not contain the cues of context and structure found in prose. It is thus possible that when learning from pictures, children are more likely to choose and remember unimportant details, or make and remember incorrect interpretations. This explanation fits the abstract results nicely, because one could logically expect that abstract information would be less obvious in pictures than in prose. By the same line of reasoning,

however, one could expect that mislearning of concrete information would be higher from prose than from pictures, because concrete information should be more explicit in pictures. Results found by Hannafin and Carey (1981, Note 3) match this reasoning, but findings of the present study are exactly the opposite. The Hannafin and Carey study was conducted with fourth grade rather than third grade learners, perhaps indicating a developmental difference in the ability to use pictures. This aspect of mislearning certainly bears further investigation, as do the more general questions raised by the finding that response errors were not random, but were in part related systematically to the type of presentational stimulus used in instruction.

In conclusion, third grade students recalled more correct and incorrect information from pictures than from oral prose, but students recalled the most correct and the least incorrect information from combined picture with oral prose presentations. The study failed to confirm previous research about the interactions among types of stimuli, learner ability levels, and types of content. Finally, the study raised some new questions about the effects on testing of types of presentational stimuli and types of scoring techniques.

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Table 1

Mean Scores for Recall of Abstract and Concrete Information by Treatment

Presentation	Abstract Recall	Concrete Recall	Overall Recall
Oral (n=52)	4.62	5.87	5.24
Picture (n=49)	4.95	6.61	5.78
Close-Up (n=50)	5.42	7.18	6.31
Oral+Pic (n=51)	6.35	8.54	7.45
Oral+Close (n=45)	7.93	9.43	8.68
Overall (N=248)	5.80	7.45	6.63

(total possible correct = 14)

Table 2

Mean Number of Incorrect Responses on the Immediate Test that were Repeated on the Delayed Test

Presentation	Abstract	Concrete	Overall
Oral (n=52)	2.68	2.06	2.37
Visual (n=99)	3.09	2.65	2.87
Oral+Visual (n=96)	2.33	1.59	1.95
Overall (n=248)	2.71	2.11	2.41